

Site Need Statement

General Reference Information	
1 *	Need Title: Double-Shell Tank (DST) Transfer Piping Non-Destructive Examination (NDE) Tools
2 *	Need Code: RL-WT106
3 *	Need Summary: Compliance to <i>Washington Administrative Code</i> (WAC) 173-303-640(2) requires the assessment of existing dangerous waste tank system's integrity. This assessment must determine that the tank system is adequately designed and has sufficient structural strength and compatibility with the waste(s) to be stored or treated, to ensue that it will not collapse, rupture, or fail. In addition, Washington Department of Ecology Administrative Orders 00NWPKW-1250 and -1251 requires that by March 31, 2006 an integrity assessment report for the Hanford Site Double-Shell Tank System be submitted that assesses the integrity of the 28 DSTs and their ancillary equipment. The DST buried transfer pipelines are considered as ancillary equipment, and thus part of the DST system. Current practice for NDE examination of DST system buried transfer piping is to perform a visual examination and video recording of the condition of the piping when it is exposed by excavation activities as a result of conducting project related activities. This practice only allows for examination of the outer surface of primary transfer line or the outer surface of the secondary piping for lines that are double encased. Lack of more detailed information concerning the buried transfer line's condition and remaining wall thickness raises issues regarding its adequacy for service.
4 *	Origination Date: November 2001
5 *	Need Type: Technology Need
6	Operation Office: Office of River Protection (ORP)
7	Geographic Site Name: Hanford Site
8 *	Project: Safe Storage/Tank Farm Operations PBS No.: RL-TW03
9 *	National Priority: <u> X </u> 1. <u>High</u> - Critical to the success of the EM program, and a solution is required to achieve the current planned cost and schedule. <u> </u> 2. <u>Medium</u> - Provides substantial benefit to EM program projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays). <u> </u> 3. <u>Low</u> - Provides opportunities for significant, but lower cost savings or risk reduction, may reduce the uncertainty in EM program project success.
10	Operations Office Priority:
Problem Description Information	
11	Operations Office Program Description: The overall purpose of the safe-storage function is to operate and maintain the double shell tank (DST) and single shell tank (SST) farms in a safe and compliant manner until the contained wastes are retrieved and the tank farms are ready for closure. This includes performing day-to-day operations, maintaining and upgrading infrastructure, resolving safety issues, assessing tank integrity, characterizing the waste, and managing the DST waste inventory. This function also includes interim stabilization of selected SSTs. The end state of safe storage is containment of DST and SST tank wastes in a manner that supports safe retrieval for final waste disposal; tank-farm structures, including DSTs and SSTs, ready for final disposal and closure; and tank farms amenable and ready for the mitigation of any environmental releases that occurred during storage and retrieval of tank waste.
12	Need/Problem Description: Comprehensive characterization of the condition of DST transfer lines is required to assess structural adequacy and compatibility with the waste(s) to be stored or treated and to ensure that the transfer lines will not collapse rupture or fail. Non-destructive examination data that characterizes transfer line remaining wall thickness, the extent of pitting and/or the extent of corrosion is required to fully assess the existing dangerous waste tank system's integrity per WAC 173-303-640(2). Accordingly, NDE data regarding the condition of the DST transfer lines is required to support development of the DST integrity assessment report in accordance with the Washington Department of Ecology Administrative Orders 00NWKKW-1250 and -1251 by March 31, 2006.

	<p>Consequence of Not Filling Need: A determination that the DST transfer lines are adequate and have sufficient strength and compatibility with the waste(s) to be stored or treated, to ensure that it will not collapse, rupture or fail, is at risk and could be challenged. Issues regarding structural adequacy of the lines could be raised, thus jeopardizing the acceptability of the DST system integrity assessment report to be submitted in March 31, 2006. In addition, transfer line failures could adversely impact planned waste processing activities, waste feed delivery schedules and scheduled completion of programmatic mission goals.</p> <p>** Program Baseline Summary (PBS) No.: TW03</p> <p>** Work Breakdown Structure (WBS) No.: 5.01.03.05</p> <p>** TIP No.:</p>
13	<p>Functional Performance Requirements: The NDE equipment must be capable of traversing the inside of the DST system transfer piping that ranges in size from 2-inch-diameter schedule 40 to 6-inch-diameter schedule 40, must be retrievable, and must be capable of characterizing wall thinning, pitting and corrosion. The equipment must be capable of identifying exact locations of any flaws or indications recorded. The NDE equipment must be capable of traversing pipe bends and performing reliably in a high radiation environment under field conditions on rough surfaces including, but not limited to, weld spatter mill scale, irregular weld joints, and corrosion compounds.</p>
**	<p>Schedule Requirements: Availability of DST transfer line NDE equipment by the end of FY 2003 would allow time for conducting transfer line examinations to support preparation of the DST integrity assessment report by March 31, 2006, per Washington Department of Ecology Administrative Orders 00NWPKW-1250 and -1251.</p>
14	<p>Definition of Solution: NDE equipment capable of characterizing DST system transfer piping wall thinning, pitting and corrosion.</p>
15 *	<p>Targeted Focus Area: Tank Focus Area (TFA)</p>
16	<p>Potential Benefits: Offsetting of a potential large negative impact on mission goals/objectives due to a transfer line failure.</p>
17 *	<p>Potential Cost Savings: n/a</p>
18 *	<p>Potential Cost Savings Narrative: This technology would not necessarily provide a cost savings, but would provide an additional method (besides pressure testing) for assessing integrity of transfer piping. Potential cost savings could result if flaws undetected by pressure testing were identifiable with this technology, thus reducing risk of failure during waste transfers. Quantification of such cost benefit would be highly speculative.</p>
**	<p>Technical Basis: Present Nondestructive Evaluation (NDE) techniques can only detect and characterize Stress Corrosion Cracks (SCC), corrosion or other anomalies in the narrow slot regions at the bottom of the double-shell tanks. These slot areas only provide access to 1-2% of the high-stress region of the tanks, which is not adequate for integrity assessment. TSAFT technology, developed at PNNL for inspecting components and piping in nuclear reactor systems, has the potential for providing detailed characterization of cracking or corrosion in the entire knuckle region of the tanks.</p>
19	<p>Cultural/Stakeholder Basis: Given the history of single-shell tank leaks and other spills to the environment that have resulted in contamination and groundwater, uncertainty regarding existing DST system conditions and the rate of deterioration of ancillary equipment by corrosion could raise stakeholder concerns.</p>
20	<p>Environment, Safety, and Health Basis: Assessing the integrity of the DST system transfer lines reduces the risk of failure to meet programmatic mission goals and spills to the environment by allowing early detection of any degradation and timely corrective action, including transfer line replacement.</p>
21	<p>Regulatory Drivers: Washington Administrative Code (WAC) 173-303-640(2) requires physical examination (NDE) or leak test as part of an integrity assessment program.</p> <p>Washington Department of Ecology Administrative Orders NWPKW-1250 and -1251.</p>
22 *	<p>Milestones: Submit DST system integrity assessment report by March 31, 2006 per Washington Department</p>

	of Ecology Administrative Orders NWPKW-1250 and -1251.
23 *	Material Streams: TW03 - Sludge, salt, liquid (RL-HLW-20)
24	TSD System: Double Shell Tank systems
25	Major Contaminants: Pu-238, 239, 240, 241; AM-241; U-238; C-14; Ni-59/63; Nb-94; Tc-99; I-129; Cm-242; Sr-90; Cs-137; Sn-126; Se-79; chromium; nitrate; nitrite; complexants (EDTA/HEDTA)
26	Contaminated Media: Tank waste consisting of high molarity sodium hydroxide/sodium nitrate solution containing saturated saltcake and/or sludge.
27	Volume/Size of Contaminated Media: All double shell tanks are 75 feet in diameter, and about 40 feet deep, with their tops buried about 10 feet below the ground surface.
28 *	Earliest Date Required: FY 2003
29 *	Latest Date Required: FY 2003
Baseline Technology Information	
30	Baseline Technology(ies)/Process: N/A Technology Insertion Point:
31	Life-Cycle Cost Using Baseline: N/A
32	Uncertainty on Baseline Life-Cycle Cost: N/A
33	Completion Date Using Baseline: FY 2006
Points of Contact (POC)	
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*Element of a Site Need Statement appearing in IPABS-IS

**Element of a Site Need Statement required by CHG